

## **Floristic elements of Central India (North Madhya Pradesh)**

**J.P. Kaushik**

School of Studies in Botany,  
Jiwaji University, Gwalior - 474 011, India

---

### **Abstract**

Present communication deals with the floristic elements of North Madhya Pradesh covering an area of 44644 km<sup>2</sup> of semi-arid land. The area has two bioclimatic zones, i.e., the humid southern part with moderate summer, and the dry northern part with hot summer. There are numerous exotic taxa which are either naturalized or are being naturalized. The flora of the region is composite type with about 16.62% Indian elements and dominated by Western and tropical elements (62.37%). The southern part has fairly higher percentage of eastern elements (16.15%) while the northern part has a higher percentage of Western (29.15%) and other warmer elements (19.08%).

### **INTRODUCTION**

The flora and vegetation of Madhya Pradesh (M.P.) especially the northern part of the state have been studied very little. The area has varied topographical, climatic and edaphic conditions, due to which it harbours a variety of plant life. Anthropogenic and developmental activities have drastically changed the microclimatic conditions, providing open beds for aggressive "neophytes" with mounting pressure on the existing plant species and depleting the original plant cover (Kaushik, 1983). As a result, some species have vanished from the area and certain others fast disappearing (Kaushik, 1994). This has lead to the change in floristic composition of the area. The importance of phytogeographical analysis for an understanding of the flora is well known (Walter, 1927). The angiospermic flora of this region has been investigated and about 1209 species were recorded by various workers. The area of northern Madhya Pradesh is situated in "Indo-Gangetic depression" (Hooker, 1904; Chatterjee, 1940, 1960) but according to the classification of Razi (1955), this area is situated at the borders of Rajwara, Bundelkhand, Malwa and Upper Gangetic plain and hence very significant. An attempt is being made to analyse the floristic elements of this area and to provide plausible explanation for the variation in floristic composition in relation to varied environmental conditions.

### **Physiography and Climate**

The area of present study comprises Datia, Morena, Bhind, Gwalior, Shivpuri and Guna districts covering about 44644 km<sup>2</sup> of land, which is about 10% of the total area of Madhya

### J.P. Kaushik

Pradesh -the largest state of the country and is situated between 23°-5'-26°-52' N and 76°-22'-79°E at an average height of 250 m to 450 m above MSL.

The climate of the area is semi-arid type with temperature varying from 3°C (minimum) to 48°C (maximum), while annual rain ranges from 619 mm to 1262 mm. The relative humidity varies from 16.8% to 97%. The area has long dry period and precipitation is mainly restricted from July to September and has two bioclimatic zones: (i) semi arid hot summer zone with no summer surplus water which includes Northern part (Gwalior, Morena, Bhind and Datia districts) of the study area, and (ii) semi-arid with moderate summer zone (Shivpuri and Guna districts) which is comparatively cooler and humid (Kaushik, 1994).

## FLORISTIC ANALYSIS AND DISCUSSION

Floristic elements, in the flora of the North Madhya Pradesh belonging to various classes and groups (Bharucha & Mehr-Homji, 1965) are shown in Table 1.

Though Hooker (1904) and Champion and Traver (1938) opined that India has no flora of its own. Chatterjee (1940, 1960) demonstrated that 61.5% of Indian flora is endemic. Although there are no local endemic elements in the present area, the Indian elements (16.62%) are fairly represented. Indo-Malaysian and Australian (Eastern elements) are well represented (16.15%) in the southern part (Guna). Similarly temperate elements (6.8%) are also higher in southern part. The climatic conditions probably have played an important role in this differential distribution of various elements. The Western and tropical elements are very high (62.37%) in the whole area but their representation in northern part is higher (70.18%) in comparison with cooler and wetter southern part (41.43%). The distribution of these elements is favoured by warm environmental conditions (Mehr-Homji & Misra, 1973). The general elements such as very aggressive weeds, are well represented throughout the area.

The percentage of distribution of various phytogeographical elements of this area (Table 2) when compared with that of India (Nayar, 1977) showed major deviations. This is quite natural as the area under study is very small compared to that of the whole country.

The present study area is situated in central part of India and contain trees of the species of genera such as *Diospyros* L., *Drypetes* Vahl, *Dalbergia* L.f., *Ficus* L., *Grewia* L., *Mallotus* Lour., *Miliusa* Lesch. and *Phyllanthus* L. which are common to Peninsular India. Similarly, *Baliospermum montanum* (Willd.) Muell.-Arg., *Boerhaavia chinensis* (L.) Asch. & Sch., *Cyanotis arachnoides* Cl., *Merremia aegyptica* (L.) Urban, *Micromeria biflora* Benth., *Rostellularia procumbens* (L.) Nees and *Syzygium heyneanum* (Duthie) Wall. are the species occurring in ghats (Subba Rao & Kumari, 1981). This area also harbours elements of cold regions, such as *Pseudaechmanthera glutinosa* (Nees) Bremek. (Himalayan), *Ranunculus scleratus* L., *Spergula arvensis* L., *Dopatrium junceum* Buch.-Ham. (Japan and China) and *Barleria cristata* L. (China).

## Floristic elements of Central India

Table 1. Floristic Elements in the Flora of North Madhya Pradesh and its bioclimatic zones

Class/Group	Percentage of Floristic elements		
	North M.P.	Northern dry zone	Southern humid zone
INDIAN	16.62	13.05	15.57
Indo-Malaysian	6.70	2.36	14.42
Australian	0.83	0.53	1.73
EASTERN	7.53	2.89	16.15
Saharo-Sindian	4.46	6.71	2.88
Sudano-Rajasthanian	7.94	16.52	5.07
Mediterranean	5.54	5.26	1.27
Oriental European	0.76	0.66	3.91
WESTERN	18.70	29.15	13.13
Neotropical	8.27	9.33	7.15
Paleotropical	23.49	20.26	10.27
Pantropical	11.58	11.18	11.88
Madagascarian	00.33	0.26	—
TROPICAL	43.67	41.03	29.30
GENERAL	8.27	10.50	19.08
Subtropical and temperate	1.32	1.31	1.73
Himalayan	0.16	--	--
Chinese	3.56	1.84	5.07
Sri Lankan	0.16	0.26	—
	5.20	3.41	6.80

## J.P. Kaushik

Table 2. Percentage of distribution of phytogeographical elements of India and North M.P.

Elements	India	North M.P.	Northern dry zone	Southern humid zone
Indian	30	16.62	13.05	15.57
Eastern	35	12.73*	6.30*	23.30*
Western (warmer)	8	62.37+	70.18+	42.43+
General	26	8.27	10.50	19.08

\* including Eastern and temperate elements; + including Western and tropical elements.

The percentage composition of various phytogeographical elements of this area is similar to that of Delhi (Maheshwari, 1963) and part of Punjab (Sharma *et al.*, 1988) having similar environmental conditions. Therefore, it can safely be concluded that flora of the area is of composite type, evolved as a result of migration of species from various parts, as there is no barrier for migration of species. The factors favouring this immigration of exotic species are deforestation and various types of developmental activities (Jain, 1967), resulting in the depletion of the original plant cover (Kaushik, 1983) and providing open bed for aggressive exotics (Jain, 1967). This, along with changes in climatic conditions of the area, provided a favourable environment for a composite type of flora (Maheshwari, 1963; Sharma *et al.*, 1988). The higher temperature and prolonged dry conditions in the area are responsible for higher percentage of the elements of tropical and warm countries (Mehr-Homji & Misra, 1973). When we compare these floristic elements of the northern Madhya Pradesh with those of Guna with comparatively higher rainfall, low temperature and better vegetation cover, we see that temperate Mediterranean, European and Indo-Malaysian (Eastern) elements are comparatively higher (Table 1) in the latter area (Chaturvedi, 1984).

The floristic history of this area reveals that the whole area was once occupied by a uniform vegetation (Jain, 1967) consisting of temperate and eastern elements. There was, however, a change in environmental conditions due to anthropogenic activities which resulted in the present delimitation of the two bioclimatic zones each with its own characteristic flora.

## Acknowledgement

The author is highly thankful to Prof. R.R. Das, Head, School of Studies in Botany, Jiwaji University, Gwalior for suggestions and criticism during the preparation of this paper.

## Floristic elements of Central India

## Literature cited

- Bharucha, F. R. & V. M. Meher-Homji. 1965. On the floral elements of the semi-arid zones of India and their ecological significance. *New Phytol.* 64: 330-342.
- Champion, H. G. & G. Traver. 1938. *Manual of Indian Silviculture*. London.
- Chatterjee, D. 1940. Studies on the endemic flora of India and Burma. *J. Asiatic Soc. Bengal* 5(1): 19-67.
- Chatterjee, D. 1960. Floristic patterns of Indian Vegetation. *Proc. Summer School of Botany*. Darjeeling. pp. 32-42.
- Chaturvedi, R. N. 1984. *Floristic Studies of Chanderi, Mungaoli, Ashoknagar Tehsils of Guna District*. Ph.D. thesis (unpublished), Jiwaji University, Gwalior.
- Hooker, J. D. 1904. *A sketch of the flora of British India*. London.
- Jain, A. K. 1978. *Study of the vegetation of certain area of Chambal ravines*. Ph.D. thesis (unpublished), Jiwaji University, Gwalior.
- Jain, S. K. 1967. Phytogeographical considerations on the flora of Mt. Abu. *Bull. Bot. Surv. India* 9(1-4): 68-78.
- Kaushik, J. P. 1983. *Flora of Shivpuri, M.P.* Gwalior.
- Kaushik, J. P. 1994. Effect of environment on the flora of Gwalior of Northern Madhya Pradesh. *Acta Ecol.* 16(1): 41-49.
- Maheshwari, J. K. 1963. *Flora of Delhi*. New Delhi.
- Meher-Homji, V. M. & K. C. Misra. 1973. Phytogeography of the Indian sub-continent. In: R. Misra, & J.S. Singh (Eds.), *Progress of Plant Ecology*.
- Nayar, M. P. 1977. Changing patterns of the Indian flora. *Bull. Bot. Surv. India* 19: 145-155.
- Razi, B. A. 1955. Some observations on the plants of the South Indian hill-tops and their distribution. *Proc. Natl. Inst. Sci. India* 21 B : 79-89.
- Sharma, M., D. S. Dhaliwal, Rakesh Guha & P. Sharma. 1988. *Flora of semi-arid Punjab, India*. Patiala.
- Subba Rao, G.V. & G. R. Kumari. 1981. Some interesting plants common to Western and Eastern Ghats. *Bull. Bot. Surv. India* 23: 30-37.
- Walter, H. 1927. *Eiführung in die Allgemeine Pflanzengeographie*. Jena. (Original not seen)